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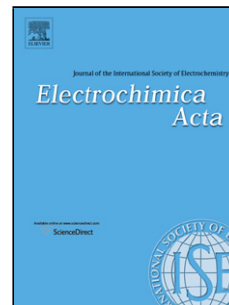
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Characterization of electrochemical and passive behaviour of Alloy 59 in acid solution

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Abstract

The electrochemical behaviour and passive film properties of the Alloy 59 in sulfuric acid solution was evaluated by the potentiodynamic electrochemical measurements, electrochemical impedance spectroscopy, Mott-Schottky approach, and ex-situ surface analytical technique as X-ray photoelectron spectroscopy (XPS) and Auger Electronic Spectrometer (AES). The results confirmed that the Alloy 59 exhibits well passive behaviour. A considerably thinner n-type passive film is observed on this type alloy. Based on the evaluations of surface composition analysis, the primary constituents of passive film formed in the air and acid solution are different, with the (Cr, Ni)-oxides and (Cr, Ni) hydroxides, respectively.

Keywords: Alloy 59, Passive film, Ni-Cr-Mo alloys, XPS, AES

1. Introduction

As is evident from the composition of the various alloys of the C family, Ni-Cr-Mo alloy, Alloy 59, has the highest chromium plus molybdenum content with the lowest iron content of typically less than 1%. It is one of the highest nickel-containing alloys without the addition of any other alloying elements, such as tungsten, copper, or titanium [1]. Because of its excellent corrosion resistance, this alloy was selected as the reference material for the hydrofluoric acid production,

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